

REMARKS

Claims 1-4, 6, 7, 11-14, 16-22 and 24-35 are pending. By this Amendment, claims 1, 7, 11, 17, 19, 25 and 30 have been amended. Claims 5, 8-10, 15 and 23 are cancelled and claims 33-35 are added. Reconsideration in view of the above amendments and the following remarks is respectfully requested.

At the outset, submitted herewith is a replacement sheet for Figure 1. In the replacement sheet, the lead lines for elements 16a and 22 have been changed, per the attached marked-up copy of Figure 1. The Examiner is requested to provide an indication in the next Office Action regarding entry of the proposed drawing correction.

Claims 1, 2, 4-12, 14-20, 22-26 and 28 were rejected under 35 U.S.C. §102(b) over Fukazawa et al. (JP 359115403 A). This rejection is respectfully traversed.

Claim 1 is directed to a seal assembly for a turbine. The seal assembly comprises a base seal member configured to be positioned on an inside surface of the main casing and an abradable seal member designed and configured for application to a tip portion of the at least one bucket, the abradable seal member being positionable in facing relation to the base seal member. The base seal member is designed as a modular replaceable insert selectively insertable within the inside surface of the main casing.

Fukazawa et al. does not teach or suggest this subject matter. In particular, Fukazawa does not teach that the base seal member is designed as a modular, replaceable insert selectively insertable within the inside surface of the main casing.

Similarly, Fukazawa et al. does not teach or suggest the method of claim 11 including designing the base seal member as a modular, replaceable insert selectively insertable within the inside surface of the main casing. Independent claim 19 includes similar subject matter.

Dependent claims 2, 4, 6, 7, 12, 14, 16-18, 20, 22-26 and 28 are patentable by virtue of their dependency on respective ones of independent claims 1, 11 and 19, and for the additional features they recite.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1, 2, 4-12, 14-20, 22-26, 28 and 29 were rejected under 35 U.S.C. §102(b) over Foster (U.S. Patent No. 3,339,933).

Foster does not teach or suggest the seal assembly including a base seal member configured to be positioned on an inside surface of the main casing and an abradable seal member designed and configured for application to a tip portion of the at least one bucket, as recited in independent claim 1.

In the Office Action, element 16 is indicated to be an abradable seal member. However, element 16 is a surface based on bonded alumina, a preferred high temperature abrasive oxide material, i.e., a "non-abradable" material (column 2, line 38). Teeth 12 will be worn at their tips 20 as they contact non-abradable surface 16, i.e., surface 16 is capable of abrading tips 20. See column 2, lines 36-61. Accordingly, element 16 is not an abradable member, but rather is a non-abradable member which is intended to wear down tips 20.

Further, Foster does not teach or suggest that the base seal member is designed a modular replaceable insert selectively insertable within the inside surface of the main casing, as recited in claim 1.

With respect to claim 11, Foster does not teach a method including providing an abradable seal member to a tip portion of at least one bucket. In the Office Action, element 32 is identified as being the base seal member 32 and element 16 is identified as the abradable seal member. See, e.g., Figures 3 and 4. As mentioned, member 16 is not an abradable member. In

addition, what the Examiner has identified as a base seal member 32 is not provided on the inside surface of the stator casing.

Further, Foster does not teach a method including designing the base seal member as a modular replaceable insert selectively insertable within the inside surface of the main casing, as recited in claim 11.

With respect to independent claim 19, Foster does not teach a base seal member positioned on an inside surface of the main casing and an abradable seal member provided to a tip portion of the at least one bucket. Again, member 16 is not an abradable seal member and element 32 is not positioned on an inside surface of the main casing, as recited in claim 19.

Further, Foster does not teach or suggest that the base seal member is designed as a modular, replaceable insert selectively insertable within the inside surface of the main casing, as recited in claim 19.

Dependent claims 2, 4, 6, 7, 12, 14, 16-18, 20, 24-26, 28 and 29 are patentable by virtue of their dependency on one of independent claims 1, 11 or 19, and for the further features they recite.

For example, Foster does not teach or suggest that the abradable seal member of the at least one bucket will allow the base seal member to cut a groove into the abradable seal member, if, in operation, contact occurs between the abradable seal member and the base seal member, as recited in dependent claims 4, 14 and 22. Foster teaches the use of a non-abrading member 16 (see column 2, line 38) which is provided to the outer surface of a rotor 14 (Figure 1), the inner surface of a casing (Figures 2 and 3), or the outer surface of a bucket shroud 30 (Figure 4). Non-abradable surface 16 is intended to wear teeth 20 (Figure 1), blade tips 26 (Figure 2) or sealing projections 32 (Figures 3 and 4). There is no teaching or suggestion that the abradable portion of

Foster's seal assembly, i.e., teeth 20, blade tips 26 or sealing projections 32, allow the base seal member to cut a groove into the abradable seal member, as recited in claims 4, 14 and 22.

Further, Foster does not teach or suggest that the base member includes at least one knife edge, as recited in dependent claims 7, 17 and 25. As indicated in column 3, lines 13-16, hard surface 16 would readily abrade tip 26 (Figure 2), which means that tip 26 is the only member that can qualify as an abradable member. If tip 26 is the abradable member, then surface 16 must comprise the base seal member. However, the base seal member does not include at least one knife edge, as recited in claims 7, 17 and 25.

In addition, Foster does not teach that the abradable seal member is a coating. As explained above, coating 16 is not an abradable seal member. Further, while column 3, lines 12-17 indicate that surface 16 will readily abrade tip 26, meaning that tip 26 is an abradable member, tip 26 is not a coating, as recited in claims 6, 16 and 24.

Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 1, 2, 4-12, 14-20, 22-25 and 27 were rejected under 35 U.S.C. §102(e) over Nava (U.S. Patent No. 6,533,285). This rejection is respectfully traversed.

Nava does not teach or suggest that the base seal member is designed as a modular, replaceable insert selectively insertable within the inside surface of the main casing, as recited in independent claims 1, 11 and 19. Nava indicates that sealing region 32 includes an abradable coating 34, but is silent as to whether the base seal member is designed as a modular replaceable insert selectively insertable within the inside surface of the main casing. Nava simply indicates that the fins 30 may be placed on the shroud 28 extending inwardly with the tip portion having the abradable coating applied by some conventional manner such as air plasma spray or flame spray. See, column 2, lines 28-37.

In addition, Nava does not teach or suggest that the tip portion includes a bucket cover inside abradable seal members provide don said bucket cover, as recited in dependent claim 18. Nava et al. is silent as to use of a bucket cover.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 3, 13 and 21 were rejected under 35 U.S.C. §103(a) over Fukazawa. This rejection is respectfully traversed at least for the reason that claims 3, 13 and 21 dependent from independent claims 1, 11 and 19, respectively, and are patentable by virtue of their dependency.

In addition, claims 3, 13 and 21 recite that the distance between the inside surface of the main casing and the tip portion of the bucket is between about .250 millimeters and about 2.05 millimeters and that the predetermined tolerance is between about 0.250 and about .1 millimeters. The Office Action acknowledges that Fukazawa fails to teach or suggest this subject matter, but indicates that it appears that the turbine of Fukazawa would perform equally well with the dimensions as set forth in claims 3, 13 and 21. However, it is the responsibility of the Patent Office to establish a *prima facie* case for obviousness as to why one of ordinary skill in the art, at the time of the present invention, would have modified Fukazawa to include the predetermined distance and predetermined tolerance recited in claims 3, 13 and 21. Moreover, it is not necessary that the Applicants disclose that the predetermined distance and predetermined tolerance solve any stated problem or has any unexpected result. While Applicants acknowledge that such information may be relevant to obviousness, this still does not relieve the Patent Office from establishing a *prima facie* case of obviousness.

Furthermore, Applicants respectfully submit that advantages of the claimed structure are pointed out in the present specification. For example, paragraph [0035] of the specification indicates that reduced clearances allow rub during transient operation and retaining the knife-

edge or strip seals in the stationary components, which greatly enhances the repairability/availability of the turbine. Another possible additional benefit is that the addition of the abradable seal, e.g., a coating, reduces the effects of variance in efficiency caused by manufacturing and assembly processes, which impact cold clearances, thus improving the likelihood that multiple units of the same design or product line will have similar performance during operation.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 30-32 were rejected under 35 U.S.C. §103(a) over Foster in view of Brandon. This rejection is respectfully traversed.

At the outset, Applicants have placed claim 30 into independent form to include the original subject matter of original claims 19 and 30. Claims 31 and 32 remain unchanged.

Claim 30 is directed to a turbine comprising a stator including a nozzle vane provided with a supplemental base seal member and a rotor including an outer surface provided with a supplemental abradable seal, in facing relation with the supplemental base seal member. In the Office Action, it is stated that Foster includes a stationary seal comprising a base seal member attached to the main casing and an abradable seal member formed on the rotor as shown in Figure 1. Coating 16, however, is not an abradable seal member formed on the rotor as shown in Figure 1. The surface is in fact a non-abrading member (column 2, line 38) which is intended to wear down the tips 20, and to insulate the rotor 14 from frictional heat which results from contact between teeth 20 and rotor 14. Therefore, Foster does not teach an abradable member provided to the rotor, as set forth in claim 30.

In addition, Foster does not teach or disclose a nozzle vane provided with a supplemental base seal member, as acknowledged in the Office Action.

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Brandon is relied upon for showing of a nozzle vein 13 which includes a base seal 14 having knife seals. However, Brandon does not make up for the above-noted deficiency in Foster since it does not teach an abradable seal member which is provided to rotor 23.

Similarly, neither Foster nor Brandon teach or suggest an abradable seal member designed and configured for application to the outer surface of the rotor, as recited in claim 31.

Claim 32 is patentable by virtue of its dependency to claim 31, in addition to the further features it recites.

Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 33-35 are provided to reintroduce the subject matter cancelled from dependent claims 7, 17 and 25.

In view of the above amendments and remarks, Applicant respectfully submits that all the claims are patentable and that the entire application is in condition for allowance.

Should the Examiner believe that anything further is desirable to place the application in better condition for allowance, she is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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AMENDMENTS TO THE DRAWINGS:

Attached is an annotated sheet of drawings with minor revisions to Figure 1. A replacement sheet is also attached.

Attachment: Replacement Sheet(s)
Annotated Sheet Showing Changes

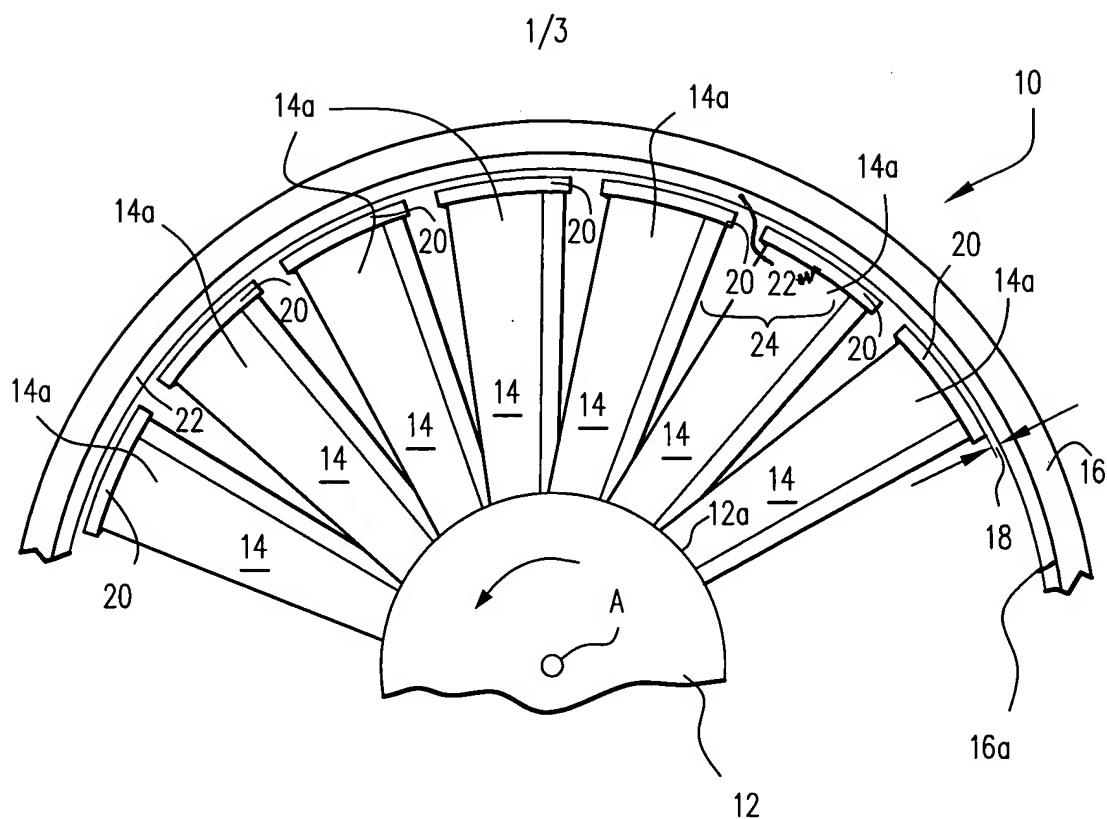


Fig. 1

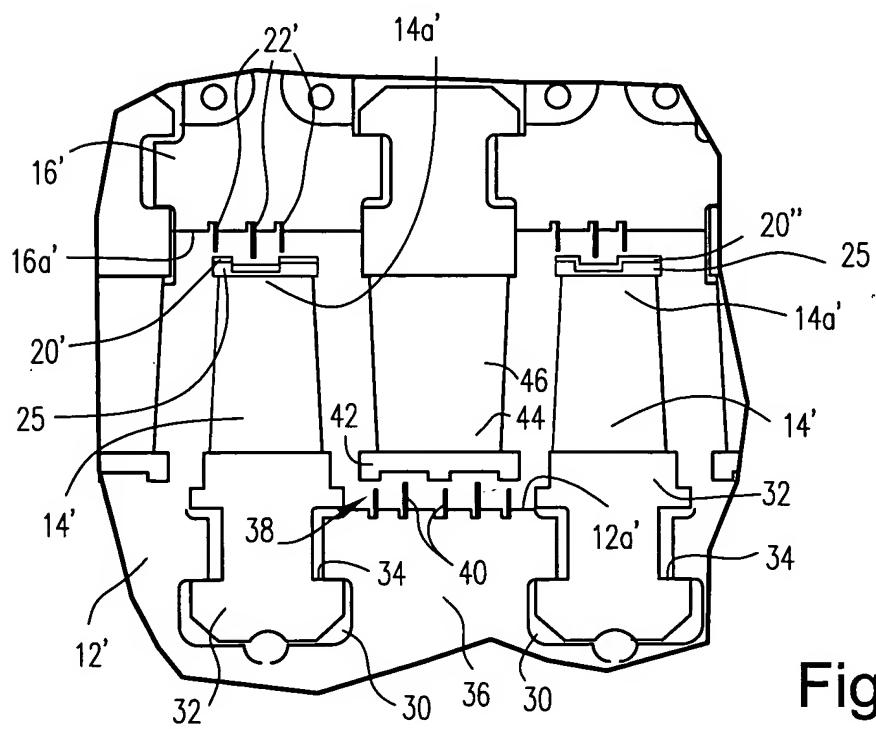


Fig. 2